

CLAIMS

What is claimed is:

1. An apparatus for synchronizing interactive contents, the apparatus comprising:
a synchronized multimedia element determining unit, which determines whether multimedia elements included in the interactive contents are synchronized with audio visual (AV) contents; and
an application program interface (API) transmitting unit, which transmits an API corresponding to an interactive control command to an AV contents reproducing engine that reproduces the AV contents and a synchronized multimedia element reproducing engine that reproduces the multimedia elements that are determined to be synchronized with the AV contents by the synchronized multimedia element determining unit.
2. The apparatus of claim 1, wherein the AV contents are digital versatile disk (DVD) contents and the interactive contents are expressed by a markup document and/or are resources referred to in the markup document.
3. The apparatus of claim 2, wherein the synchronized multimedia element determining unit parses and interprets the interactive contents that are expressed by the markup document including information about whether the multimedia elements are synchronized with the AV contents and determines whether the multimedia elements included in the interactive contents are synchronized with the AV contents, the information being included in the markup document as meta tags, newly defined tags, newly defined attributes, scripts, or binary data.
4. The apparatus of claim 3, wherein the synchronized multimedia element determining unit comprises:
an interactive contents parsing unit which parses the interactive contents that are expressed by the markup document and creates a document object model (DOM) tree; and
an interactive contents interpreting unit which interprets the DOM tree created by the interactive contents parsing unit and determines whether elements in each node of the created DOM tree are the multimedia elements that are synchronized with the AV contents.

5. The apparatus of claim 1, wherein the interactive control command is a play command, a stop command, a previous screen view command, or a next screen view command, and the synchronized multimedia element reproducing engine is a plug-in player.

6. The apparatus of claim 5, wherein the plug-in player is a WINDOWS media player, a flash player, or a real player.

7. The apparatus of claim 6, wherein the multimedia elements include audio files, real moving picture files, and animation moving picture files that are reproduced in the WINDOWS media player, the flash player or the real player.

8. The apparatus of claim 7, wherein the API transmitting unit comprises:
an interactive control command receiving unit which receives the interactive control command that is the play command, the stop command, the previous screen view command, or the next screen view command from users; and
an interactive control command corresponding API transmitting unit which transmits the API corresponding to the interactive control command received by the interactive control command receiving unit to the AV contents reproducing engine that reproduces the AV contents and the synchronized multimedia reproducing engine that is the WINDOWS media player, the flash player, or the real player that reproduces the audio files, the real moving picture files, and the animation moving picture files that are determined by the synchronized multimedia element determining unit to be the multimedia elements synchronized with the AV contents.

9. An apparatus for synchronizing and reproducing interactive contents, the apparatus comprising:

an interactive contents synchronizing unit which determines whether multimedia elements included in the interactive contents are synchronized with audio visual (AV) contents and transmits an application program interface (API) corresponding to an interactive control command;

an AV contents reproducing engine which receives the API transmitted from the interactive contents synchronizing unit and reproduces the AV contents according to the received API; and

a synchronized multimedia element reproducing engine which receives the API transmitted from the interactive contents synchronizing unit and reproduces the multimedia elements that are determined by the interactive contents synchronizing unit to be synchronized with the AV contents.

10. The apparatus of claim 9, further comprising a contents reading unit which reads AV/interactive contents including the AV contents and the interactive contents from a predetermined storage medium or reads the AV/interactive contents by downloading from the Internet.

11. The apparatus of claim 10, wherein the interactive contents synchronizing unit parses the interactive contents included in the AV/interactive contents read by the contents reading unit.

12. The apparatus of claim 10, further comprising a contents buffer which buffers the AV/interactive contents read by the contents reading unit.

13. The apparatus of claim 12, wherein the interactive contents synchronizing unit parses and interprets the interactive contents included in the AV/interactive contents buffered by the contents buffer and determines whether the multimedia elements included in the interactive contents are synchronized with the AV contents.

14. The apparatus of claim 9, further comprising a non-synchronized multimedia element reproducing engine which reproduces the multimedia elements that are determined by the interactive contents synchronizing unit not to be synchronized with the AV contents.

15. A method of synchronizing interactive contents, the method comprising:
determining whether multimedia elements included in the interactive contents are synchronized with audio visual (AV) contents; and
transmitting an application program interface (API) corresponding to an interactive control command to an AV contents reproducing engine that reproduces the AV contents and a synchronized multimedia element reproducing engine that reproduces multimedia elements that are determined to be synchronized with the AV contents.

16. The method of claim 15, wherein the AV contents are digital versatile disk (DVD) contents and the interactive contents are expressed by a markup document and/or are resources referred to in the markup document.

17. The method of claim 16, wherein the determining whether multimedia elements included in the interactive contents are synchronized with AV contents further comprises parsing and interpreting the interactive contents that are expressed by the markup document including information about whether the multimedia elements are synchronized with the AV contents and determining whether the multimedia elements included in the interactive contents are synchronized with the AV contents, the information being included in the markup document as meta tags, newly defined tags, newly defined attributes, scripts, or binary data.

18. The method of claim 17, wherein the determining whether multimedia elements included in the interactive contents are synchronized with AV contents comprises:

parsing the interactive contents that are expressed by the markup document and creating a document object model (DOM) tree; and

interpreting the DOM tree created by the interactive contents parsing unit and determining whether elements in each node of the created DOM tree are multimedia elements that are synchronized with the AV contents.

19. The method of claim 15, wherein the interactive control command is a play command, a stop command, a previous screen view command, or a next screen view command, and the synchronized multimedia element reproducing engine is a plug-in player.

20. The method of claim 19, wherein the plug-in player is a WINDOWS media player, a flash player, or a real player.

21. The method of claim 20, wherein the multimedia elements include audio files, real moving picture files, and animation moving picture files that are reproduced in the WINDOWS media player, the flash player or the real player.

22. The method of claim 21, wherein the transmitting an API comprises:

receiving the interactive control command that is the play command, the stop command, the previous screen view command, or the next screen view command from a user; and

transmitting the API corresponding to the received interactive control command to an AV contents reproducing engine that reproduces the AV contents and a synchronized multimedia reproducing engine that is the WINDOWS media player, the flash player, or the real player that reproduces the audio files, the real moving picture files, and the animation moving picture files that are determined to be the multimedia elements synchronized with the AV contents.

23. A method of synchronizing and reproducing interactive contents, the apparatus comprising:

determining whether multimedia elements included in the interactive contents are synchronized with audio visual (AV) contents and transmitting an application program interface (API) corresponding to an interactive control command;

receiving the transmitted API and reproducing the AV contents according to the received API; and

receiving the transmitted API and reproducing the multimedia elements that are determined to be synchronized with the AV contents.

24. The method of claim 23, wherein the determining whether the multimedia elements included in the interactive contents are synchronized further comprises:

reading AV/interactive contents including the AV contents and the interactive contents from a predetermined storage medium or reading the AV/interactive contents by downloading the AV/interactive contents from the Internet.

25. The method of claim 24, wherein the determining whether multimedia elements included in the interactive contents are synchronized with AV contents comprises parsing the interactive contents included in the read AV/interactive contents.

26. The method of claim 24, further comprising buffering the read AV/interactive contents.

27. The method of claim 26, wherein the determining whether multimedia elements included in the interactive contents are synchronized with AV contents comprises parsing and interpreting the interactive contents included in the buffered AV/interactive contents and determining whether the multimedia elements included in the interactive contents are synchronized with the AV contents.

28. The method of claim 23, further comprising reproducing multimedia elements that are determined not to be synchronized with the AV contents.

29. A computer readable recording medium having embodied thereon a program for a method of synchronizing interactive contents, wherein the method comprising:

determining whether multimedia elements included in the interactive contents are synchronized with audio visual (AV) contents; and

transmitting an application program interface (API) corresponding to an interactive control command to an AV contents reproducing engine that reproduces the AV contents and a synchronized multimedia element reproducing engine that reproduces the multimedia elements that are determined to be synchronized with the AV contents.

30. A computer readable recording medium having embodied thereon a program for executing a method of synchronizing and reproducing interactive contents, the method comprising:

determining whether multimedia elements included in the interactive contents are synchronized with audio video (AV) contents and transmitting an application program interface (API) corresponding an interactive control command;

receiving the transmitted API and reproducing the AV contents according to the received API; and

receiving the transmitted API and reproducing multimedia elements that are determined to be synchronized with the AV contents.

31. A method of synchronizing a data stream, comprising:

receiving the data stream;

parsing the data stream into AV contents and interactive contents;

identifying the interactive contents to correspond to synchronized interactive contents which are synchronized with the AV contents, and non-synchronized interactive contents which are not synchronized with the AV contents; and

receiving a navigation control command; and

selectively decoding the AV contents and the synchronized interactive contents based on a result from the identification of the synchronized interactive contents and corresponding to the received navigation control command.

32. The method of claim 31, further comprising:

selectively decoding the non-synchronized interactive contents.

33. The method of claim 31, wherein the selectively decoding comprises utilizing an application program interface (API) corresponding to the navigation control command to selectively decode the AV contents and the synchronized interactive contents.

34. The method of claim 31, further comprising:

buffering the received data stream to allow more stable reproduction of the AV contents and the interactive data of the data stream.

35. The method of claim 31, wherein the AV contents comprise a digital versatile disc (DVD).

36. The method of claim 35, wherein the interactive contents allow users to control the DVD AV contents based on enhanced navigation (ENAV) commands.

37. The method of claim 36, wherein the selectively decoding is controlled so that the synchronized interactive contents are navigable in the same way as the AV contents in response to the navigation control command.

38. The method of claim 31, wherein the interactive contents comprise a markup document including information that controls the selective decoding of the AV contents and multimedia elements in the interactive contents.

39. The method of claim 38, wherein the selectively decoding further comprises:
creating a document object model (DOM) tree from the parsed interactive contents; and
identifying each node of the DOM tree representing the multimedia elements that are
synchronized with the AV contents.

40. The method of claim 39, further comprising:
identifying a plug-in corresponding to the multimedia elements that are synchronized
with the AV contents, wherein the plug-in is used to selectively decode the multimedia elements
that are synchronized with the AV contents.